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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,237	03/04/2002	Dawei Huang	HUANG 3 (58661)	6580
7590 06/27/2005 HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195			EXAMINER TRAN, KHANH C	
			ART UNIT 2631	PAPER NUMBER

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/090,237	Applicant(s) HUANG, DAWEI	
	Examiner Khanh Tran	Art Unit 2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 13-22 is/are rejected.
- 7) ☒ Claim(s) 12 and 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>03/04/02</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-11 and 13-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti U.S. Patent 5,931,965 in view of Camp et al. U.S Patent 5,592,517.

Regarding claim 1, figure 8 of Alamouti invention illustrates a wireless communication system, which employs cyclic trellis error encoding. In column 22, lines 5-40, Alamouti discusses that in catastrophic codes, a finite sequence of errors in the received signal sequence may result in an indefinite sequence of decoding errors. One sign that a code could result in a catastrophic encoder implementation is that, in a next-state table, a present state transitions into the same next state with a given output, while another present state transitions into the same next state with the same given output. The catastrophic code has distance spectrum containing an infinite component that corresponds to a finite hamming weight as appreciated by one of ordinary skill in the art.

As recited above, the wireless communication system in figure 8 employs cyclic trellis encoder 810 for encoding digital data input.

Alamouti does not teach the claimed limitation "circuit being operative for periodically inserting known symbols into the digital input data sequence".

Camp et al. invention is directed to a robust interpolator performs internal data correction to avoid catastrophic errors. Camp et al. invention employs a cascaded comb integrator (CCI) interpolating filter, which performs error correction at each cascaded integrator in the filter. As shown in figure 2, in column 4, lines 25-45, the CCI filter 28 includes a differentiator 60 connected in series to an integrator 62 by a zero order hold 64. The CCI filter 28 is thus a second order CCI filter with the zero order hold replacing an inner cascaded differentiator-integrator pair. In column 10, lines 3-10, in one embodiment, the zero order hold in any of the CCI filters described above is replaced by an inner differentiator-integrator pair, connected in series by an upsampling switch increasing the data rate of the differentiator output by the interpolator. In one example, for an interpolating factor of 20, the switch inserts nineteen zeros between every pair of successive data points of the inner differentiator output before sending the output to the integrator. Because nineteen zeros are known symbols, the CCI filter periodically inserts known symbols into the digital input data sequence, corresponding the claimed limitations "circuit being operative for periodically inserts known symbols into the digital input data sequence".

As recited above, Camp et al. invention is directed to a robust interpolator performs internal data correction to avoid catastrophic errors. Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention

that Alamouti wireless communication system can be modified to implement Camp et al. CCI filter. Motivation is that such filter would add redundant bits to minimize catastrophic errors and because of that, more codes can be utilized.

Regarding claim 2, as recited in claim 1, nineteen zeros, corresponding to the claimed known symbols, are inserted between every pair of successive data points.

Regarding claim 3, trellis-coded modulation is a forward error correction coding technique, which is also well known in the art. Trellis codes are convolutional codes that are designed and optimized according to a specific modulation scheme. In view of that, the Trellis encoder 810 in figure 8 is convolutional encoder.

Regarding claim 4, because zeros are inserted into digital input data sequence, the number of connections between Trellis nodes in a Trellis is reduced. The Trellis encoder 810 encodes the expanded data input to produce a channel coded data stream.

Regarding claim 5, the convolutional encoder 200 includes shift register memory units 205, 210, 215, as well as summers 220, 225 as shown in figure 2A. Memory units 205, 210, 215 have finite length, corresponding to m symbol. Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention that Camp et al. teachings can be modified to insert zeros in the interpolation process after each

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symbol. Motivation is that Camp et al. interpolation method is to add redundancy to the data sequence to avoid catastrophic errors. Redundant bits are added after each symbol as appreciated by one of ordinary skill in the art.

Regarding claim 6, claim 6 is rejected on the same ground as for claim 1 because claim 1 claims a system performing steps in claim 6.

Regarding claim 7, claim 7 is rejected on the same ground as for claim 2 because of similar scope.

Regarding claim 8, as recited in claim 1, the switch inserts nineteen zeros between every pair of successive data points of the inner differentiator output before sending the output to the integrator for an interpolating factor of 20 in Camp et al. teachings. In view of that for less interpolating factor, one zero can be inserted between every pair of successive data points.

Regarding claim 9, as recited in claim 5, redundant bits are added after each symbol for error correction. Hence, for the case of four-bit symbol, one zero can be inserted between every four bits of data points.

Regarding claims 10 and 13, claims 10 and 13 are rejected on the same ground as for claim 3 because of similar scope.

Regarding claim 11, because zeros are inserted between information bits.
Convolutional code includes time varying convolutional code.

Regarding claim 14, claim 14 is rejected on the same ground as for claim 5
because of similar scope.

Regarding claim 15, claim 15 is rejected on the same ground as for claim 4
because of similar scope.

Regarding claim 16, claim 16 is rejected on the same ground as for claim 5
because of similar scope.

Regarding claim 17, for each binary input sequence to trellis diagram, there is
one corresponding code word via distinct paths. Therefore, application of code word is a
one-to-one mappings to binary input sequence.

Regarding claim 18, claim 18 is rejected on the same ground as for claim 2
because of similar scope.

Regarding claim 19, claim 19 is rejected on the same ground as for claim 8
because of similar scope.

Regarding claim 20, claim 20 is rejected on the same ground as for claim 9 because of similar scope.

Regarding claim 21, claim 21 is rejected on the same ground as for claim 10 because of similar scope.

Regarding claim 22, claim 22 is rejected on the same ground as for claim 11 because of similar scope.

Allowable Subject Matter

2. Claims 12 and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Alamouti U.S. Patent 5,675,590 discloses "Cyclic Trellis Coded Modulation".

Alamouti U.S. Patent 5,907,565 discloses "Cyclic Trellis Coded Modulation".

Humblet U.S. Patent 5,812,602 discloses "System And Device For, And Method Of, Communicating According To A Trellis Code Of Baseband Signals Chosen From A Fixed Set Of Baseband Signal Points".

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

Khanh Cong Tran
Examiner KHANH TRAN
06/22/2005